Claims

1. A honeycomb structure comprising:

a plurality of honeycomb segments partitioned by partition walls and having a plurality of circulation holes penetrating in one axial direction; and

a bonding layer existing between the adjacent honeycomb segments for bonding the plurality of honeycomb segments,

wherein the bonding layer is formed by use of a bonding material including oxide fibers which satisfy the following relational expression (1),

$$0.5 \leq L \times (W / D) / 100 \leq 8 \quad (1)$$

in which L is an average length (μm) of the oxide fibers in a longitudinal direction, D is specific gravity (g/cm^3) of the oxide fibers, and W is mass percentage of content (% by mass) of the oxide fibers in the entire bonding material.

2. A honeycomb structure comprising:

a plurality of honeycomb segments partitioned by partition walls and having a plurality of circulation holes penetrating in one axial direction; and

a bonding layer existing between the adjacent honeycomb segments for bonding the plurality of honeycomb segments,

wherein the bonding layer includes oxide fibers which satisfy the following relational expression (2),

$$0.6 \leq L \times (W / D) / 100 \leq 11 \quad (2)$$

in which L is an average length (μm) of the oxide fibers in a longitudinal direction, D is specific gravity (g/cm^3) of the oxide fibers, and W is mass percentage of content (% by mass) of the oxide fibers in the bonding layer.

3. A honeycomb structure according to claim 1 or claim 2,

wherein the average length L in the longitudinal direction of the oxide fibers is set in a range from 10 to 100 μm, and

an average diameter d in a cross-section perpendicular to the longitudinal direction is set in a range from 1 to 20 μm.

4. A honeycomb structure according to any one of claim 1 through claim 3,

wherein mass percentage of the oxide fibers having a shape defined as $0.5 \leq$ (a diameter of a cross section perpendicular to the longitudinal direction) / (a length in the longitudinal direction) ≤ 1 is set equal to or below 50% by mass in the oxide fibers, and

the W is set in a range from 10% to 50% by mass.

5. A honeycomb structure according to claim 4,

wherein the mass percentage of the oxide fibers having the shape defined as $0.5 \leq$ (the diameter of the cross section perpendicular to the longitudinal direction) / (the length in the longitudinal direction) ≤ 1 is set equal to or below 10% by mass.

6. A honeycomb structure according to any one of claim 1 through claim 5,

wherein the bonding material comprises:

inorganic particles; and

a colloidal oxide.

7. A honeycomb structure according to any one of claim 1 through claim 6,

wherein heat conductivity of the bonding layer is set in a range from 0.1 to 5 W/m·K.

8. A honeycomb structure according to any one of claim 1 through claim 7,

wherein the honeycomb segment comprises any of silicon carbide and a silicon-silicon carbide compound material as a main ingredient.

9. A method of manufacturing a honeycomb structure comprising the steps of:

forming a plurality of honeycomb segments partitioned by partition walls and having a plurality of circulation holes penetrating in one axial direction; and

bonding the plurality of honeycomb segments by use of a bonding material including oxide fibers which satisfy the following relational expression (1),

$$0.5 \leq L \times (W / D) / 100 \leq 8 \qquad (1)$$

in which L is an average length (μm) of the oxide fibers in a longitudinal direction, D is specific gravity (g/cm^3) of the oxide fibers, and W is mass percentage of content (% by mass) of the oxide fibers in the entire bonding material.